



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| In re Application of: | T. WEST   | Confirmation No.:    | 8650       |
| Application No.:      | 10/633,584  | Group Art Unit:      | 3726       |
| Filing Date:          | August 5, 2003  | Examiner:            | E. Compton |
| For:                  | METHOD OF MAKING TUNGSTEN<br>CARBIDE-BASED ANNULAR JEWELRY<br>RINGS | Attorney Docket No.: | 81876-4094 |

**DECLARATION OF DEBKUMAR MUKHOPADHYAY**

**Mail Stop Amendment**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, DEBKUMAR MUKHOPADHYAY, hereby declare that:

1. I am a citizen of India and reside at 301 Carriage Blvd, Pittsburgh, PA 15239.
2. I am employed as Chief Metallurgist by General Carbide, which has been hired by Trent West, Inc. to provide consulting and advice regarding his tungsten-carbide based jewelry rings and processes for preparing the same according to the above-noted invention. I joined General Carbide in early 2004, approximately one year ago, and in my current position I am in part responsible for quality control, development of new products, and solving technical problems of powder production, powder pressing, shaping and sintering. From 1997 to early 2004 I worked as the Chief Metallurgist/Quality Control Manager at VISTA METALS, Inc. Prior to that time, I have either been employed in the field of, or studying, metallurgical engineering since receiving my initial degree in 1982.
3. I was awarded a Bachelor of Science degree in Metallurgical Engineering in 1982 from Jadavpur University in India, and Master of Science and Doctorate

(Ph.D.) degrees in Metallurgical Engineering from the University of Idaho in 1993 and 1996, respectively. I consider myself to be one of ordinary skill in this field.

4. I have reviewed and understand the above-identified patent application, the pending claims, the Office Action, and the reference cited by the Examiner in the above-identified application with respect to dependent claim 27. Specifically, this reference is US. Patent No. 3,242,664 to Lederrey ("Lederrey"). I am making the following statements regarding claim 27 as one of ordinary skill in the art in support of the patentability of claim 27 in this application.

5. Claim 27 of the above-identified application is directed to method of making a jewelry article by a method that includes providing an annular ring made of a hard material consisting essentially of tungsten carbide, with the annular ring having at least one external facet, and grinding the at least one external facet to a predetermined shape to provide a pleasing appearance to the jewelry article, with the hard material being long wearing and virtually indestructible during use of the article, wherein the hard material is formed by a single sintering step.

6. The Lederrey patent teaches a double-step sintering process to make watch cases including a portion formed of a tungsten carbide material. The first step taught by Lederrey is referred to as presintering. At the time of Lederrey's teachings, presintering was believed necessary to de-wax green compacted carbide materials, which generally had relatively large amount of wax (1-3% wax or more). The wax was necessary to provide green strength to the carbide blank. Green compacted carbide with large amounts of wax (1-3% or more) as taught by Lederrey, however, are difficult to grind according to the claimed process because the wax tends to clog the grinding equipment used in the grinding of the present process, *e.g.*, a diamond-grinding wheel rapidly gets clogged from such high amounts of wax. Therefore, Lederrey teaches presintering as being necessary to dewax the green carbide so that the carbide can be machined easily without equipment difficulties like clogging. The carbide still remains porous after presintering, which is generally done at a temperature around 350°C.

7. The Lederrey patent then also teaches the necessity of a final sintering, which takes the parts formed from the presintered block of materials and sintering them a

second time to increase the hardness and reduce the porosity. The parts to be final sintered were placed in a furnace and sintered at around 1450°C. In this final sintering, the binder melts and flows to close most or all of the porous holes or gaps in the carbide. Full density is achieved as a result of this final sintering.

8. Claim 27 advantageously recites a single sintering process, which differs from the two-step sintering process of Lederrey. In one embodiment of the present invention, the green parts are sintered in single run. The powders can be machined in the green stage when low wax is used, whereas high wax can be used to directly press green parts into near net shape, thereby avoiding need for a second sintering before final machining to polish or grind a surface, or both. The finished green parts can then be placed in the furnace and advantageously fully sintered in this single furnace run, thereby avoiding the need for additional energy, time, and cost in conducting multiple sintering steps to form tungsten-carbide jewelry articles according to the invention. Importantly, the invention recited in claim 27 elegantly avoids the presintering step taught by Lederrey, which involves cutting work pieces off a block of material that is not fully sintered in between the sintering steps (Col. 3, lines 17-42).

9. Lederrey does not provide motivation, much less a reasonable expectation of success, in using a single step sintering process as recited in claim 27. Indeed, Lederrey teaches away from the features of claim 27 in that a presintering and final sintering were taught to be essential to permit the desired shape to be carved from a block before final sintering occurred. Moreover, due to the extreme hardness of sintered tungsten carbide articles, it would not have been expected that one could readily modify watch cases or processes for making the same to be a jewelry ring or finger ring due to processing difficulties in working with tungsten carbide materials.

10. It is thus my opinion and judgment, as one of ordinary skill in the art, that claim 27 is patentably different from Lederrey's teachings of two-step sintering processes, and that the invention recited in claim 27 is not anticipated by or obvious in view of Lederrey. Additionally, there was no motivation or reasonable expectation of success in simplifying Lederrey to a single step process as recited in claim 27. Thus, my opinion and judgment is also that claim 27 is not obvious in view of Lederrey and the other cited prior art of record.

11. I further declare that all statements made herein of my knowledge are true and all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Dated this 18 Day of May, 2005.

Declarant: Debkumar Mukhopadhyay  
DEBKUMAR MUKHOPADHYAY